SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING JULY, 1928

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For a description of instruments and exposures and an account of the method of obtaining and reducing the measurements, the reader is referred to the REVIEW for January, 1924, **52**:42; January, 1925, **53**:29, and July, 1925, **53**:318.

Table 1 shows that solar radiation intensities were close to the normal values for July at all three stations.

Table 2 shows that the total solar radiation received on a horizontal surface directly from the sun and diffusely from the sky was above the July normal at Washington, slightly below at Madison, and decidedly below at Lincoln.

Skylight polarization measurements made at Washington on seven days give a mean of 46 per cent, with a maximum of 48 per cent on the 16th. At Madison measurements made on eight days give a mean of 61 per cent with a maximum of 72 per cent on the 14th. These are close to the corresponding average values for July at Madison and somewhat below at Washington.

TABLE 1.—*Solar radiation intensities during July, 1928*

[Graham-calories per minute per square centimeter of normal surface]

Date	Sun's zenith distance: 8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	[1] 1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Washington, D. C.											
July 2	13.13				0.81	1.03					12.24
July 3	14.60	0.36	0.47	0.61	0.85	1.15					13.61
July 6	13.61	0.63	0.76	0.93	1.10	1.32					14.10
July 9	19.23			0.69	0.88	1.22					17.37
July 16	15.11	0.54	0.64	0.75	0.93	1.29					12.68
July 17	16.79		0.52	0.62	0.83	1.11					14.10
July 18	18.59				0.70						18.59
July 19	14.10			0.74	0.85						16.20
July 24	15.65	0.51	0.64	0.73	0.94						15.65
July 25	14.10				0.97	1.31					13.13
July 30	9.83				0.77						10.59
July 31	14.10			0.74	0.94						11.38
Means		0.51	0.61	0.73	0.88	1.20					
Departures		−0.05	−0.04	−0.03	−0.01	+0.03					
Madison, Wis.											
July 3	9.14				1.17	1.35					9.83
July 6	6.76				1.03						7.87
July 7	7.29				1.05						9.47
July 11	6.27					1.30					10.59
July 23	10.21				1.14	1.32					10.97
July 24	10.21				0.93						10.59
July 25	11.38				0.92						15.65
July 28	8.81				1.19						12.24
Means					1.06	1.32					
Departures					+0.01	+0.04					
Lincoln, Nebr.											
July 3	14.60				1.11	1.35					18.59
July 6	14.60						1.10	0.90	0.76		14.10
July 7	16.79			0.98							16.79
July 9	12.24		0.85	1.01	1.18	1.32					13.13
July 13	13.61		0.74	0.88	1.13						10.97
July 26	15.65			0.83	1.08	1.31					13.13
July 27	11.38		0.66	0.78	0.95						8.81
Means			0.75	0.90	1.09	1.33	(1.10)	(0.90)	(0.76)		
Departures			−0.04	±0.00	±0.01	±0.00	+0.04	+0.02	+0.02		

[1] Extrapolated.

TABLE 2.—*Solar and sky radiation received on a horizontal surface*

[Gram-calories per square centimeter of horizontal surface]

Week beginning—	Average daily radiation: Washington	Madison	Lincoln	Chicago	New York	Twin Falls	Average daily departure from normal: Washington	Madison	Lincoln
1928	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
July 2	697	524	612	496	416	781	+206	−11	+29
July 9	449	542	531	436	310	682	−29	+9	−55
July 16	507	429	500	311	348	775	+37	−79	−69
July 23	510	542	482	408	439	711	+38	+50	−54
Excess or departure since first of year on July 29							+232	−697	−2,386

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. C. S. Freeman, Superintendent U. S. Naval Observatory]

[Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, and Mount Wilson Observatories]

The differences of longitude are measured from central meridian, positive west. The north latitudes are plus. Areas are corrected for foreshortening and are expressed in *millionths of sun's visible hemisphere*. The total area, including spots and groups, is given for each day in the last column]

Date	Eastern standard civil time	Heliographic: Diff. long.	Longitude	Latitude	Area: Spot	Group	Total area for each day
1928	*h. m.*	°	°	°			
July 1 (Naval Observatory).	11 32	−72.0	106.7	−27.5		370	
		−24.0	154.7	+5.5		31	
		−20.0	158.7	+19.5		15	
		−17.0	161.7	+5.0	9		
		−6.0	172.7	+8.0	25		
		+17.5	196.2	+18.0		77	
		+22.5	201.2	+18.0		52	
		+32.0	210.7	+16.5	15		
		+37.0	215.7	−20.0		556	
		+40.0	218.7	−11.0		18	
		+44.5	223.2	−21.0	123		
		+46.5	225.2	+12.0	25		
		+54.0	232.7	−12.0	123		
		+71.0	249.7	+9.0	62		1,501
July 2 (Naval Observatory).	11 36	−65.0	100.4	−28.0		278	
		−58.5	106.9	−27.5	185		
		−56.0	109.4	−16.5	9		
		−11.0	154.4	+7.0		15	
		−3.0	162.4	+5.0		6	
		+8.5	173.9	+7.5	22		
		+32.5	197.9	+17.5		154	
		+49.0	214.4	−20.0		525	
		+53.5	218.9	−12.0		62	
		+59.0	224.4	−22.0	123		
		+60.0	225.4	+12.0	31		
		+67.5	232.9	−12.5	123		1,533
July 3 (Naval Observatory).	12 8	−51.5	100.4	−28.0		278	
		−47.0	104.9	−27.5	278		
		+22.0	173.9	+8.0	15		
		+24.5	176.4	+11.5	6		
		+38.5	190.4	−14.0		25	
		+41.0	192.9	−11.5		9	
		+45.0	196.9	+17.5		123	
		+62.0	213.9	−20.0		648	
		+66.0	217.9	−12.0		123	
		+70.5	222.4	−22.5	93		
		+82.0	233.9	−12.5	123		1,721
July 4 (Naval Observatory).	11 38	−40.5	98.4	−28.0		185	
		−34.0	104.9	−27.5		309	
		+40.5	179.4	+11.0		15	
		+55.0	193.9	−13.0	6		
		+57.0	195.9	+17.5		77	
		+72.0	210.9	−19.5	340		932
July 5 (Naval Observatory).	13 53	−86.0	38.4	+6.5	309		
		−26.5	97.9	−28.0		278	
		−19.5	104.9	−27.5		247	
		+50.0	174.7	−7.5	3		
		+52.5	176.9	+11.5		46	883
July 6 (Naval Observatory).	12 5	−78.0	34.2	−12.0	123		
		−72.5	39.7	+7.0		401	
		−16.0	96.2	−29.0		93	
		−12.5	99.7	−28.5		93	
		−8.0	104.2	−28.0		278	
		+67.5	179.7	+11.0		9	
		+68.5	180.7	−8.0	6		1,003
July 7 (Naval Observatory).	11 16	−68.0	31.4	−9.5		93	
		−64.0	35.4	−11.0	132		
		−62.5	36.9	+8.0		370	
		−58.0	41.4	+6.5	340		
		−3.0	96.4	−28.5		62	
		+0.5	99.9	−28.0		185	
		+4.5	103.9	−27.5	216		
		+62.5	161.9	+21.0	6		1,404
July 8 (Naval Observatory).	11 33	−74.0	12.0	+13.5	154		
		−53.0	33.0	−10.5		185	
		−51.0	35.0	+8.0		401	
		−45.0	41.0	+7.0	293		
		+12.5	98.5	−28.0		154	
		+18.0	104.0	−27.5		139	
		+68.5	154.5	+18.0	15		1,341
July 9 (Naval Observatory).	11 39	−60.5	12.2	+13.5	154		
		−40.0	32.7	−10.5		154	
		−38.0	34.7	+8.0		370	
		−31.0	41.7	+7.0	340		
		−18.0	54.7	−4.0	15		
		+26.5	99.2	−28.0		139	
		+30.5	103.2	−27.5		154	1,326
July 10 (Harvard)	9 10	−49.0	12.0	+15.0	270		
		−27.5	33.5	−10.0		103	
		−21.5	39.5	+8.0		896	
		+42.0	103.0	−27.5		210	1,479
July 11 (Naval Observatory).	11 58	−33.5	12.6	+13.5	154		
		−15.5	30.6	−4.5		22	
		−13.0	33.1	−11.0		93	
		−11.5	34.6	+8.0		370	
		−9.0	37.1	−10.5		31	
		−3.5	42.6	+7.0		340	
		+53.0	99.1	−28.0		93	
		+58.5	104.6	−27.0	123		1,226